A risk-based guide for the fungicide treatment to prevent annosum root rot in Wisconsin

Purpose of the guide:
This guide is designed to help landowners/property managers determine whether the fungicide treatment should be considered to reduce the risk of the introduction of annosum root rot. The guide should be used also by foresters and loggers to help communicate with landowners/property managers about the fungicide treatment option. It was created to be scientifically-sound, based on currently available scientific information, and also operationally-practical in the field. A user will obtain information about whether a fungicide treatment is recommended based on current scientific knowledge and observations in Wisconsin, by simply answering a series of questions.

►Is it required to use the guide?

On state-owned Department lands – Yes

The guide should be used to help make decisions about when the fungicide treatment should be implemented. State land managers may be allowed to deviate from the guide under certain situations with written justification.

On MFL and/or other private lands - No (consideration recommended)

The use of the guide for private lands may be considered as a recommendation for BMPs (Best Management Practices). The use of the guide is recommended for private landowners for consideration; however it is **not required**. Private landowners are highly encouraged to learn about the disease and options that will reduce the risk of introducing the disease to their stand. Though the use of the guide is recommended, the final decision whether the treatment should be included at the time of harvesting will be and should be made by the landowner. Information about annosum root rot is available at the DNR website at http://dnr.wi.gov/ (Key word: annosum). Contact DNR foresters and forest health staff for more information about the disease and consultation.

On County Forest lands – No (consideration recommended)

Any use of the guide and recommended treatment is left to the discretion of the County Board, County Forestry Committee and/or County Forest Administrator.

►On which stands does the guide recommend treatment?

The guide mainly consists of the three risk factors. They are 1. Distance from stands confirmed with annosum root rot (within the 25 mile radius), 2. Density of pines (50% or more), and 3. Time of the year of harvesting (4/1-11/30). For example, with intermediate thinning, if a stand is within the 25 mile radius of confirmed stands of annosum root rot AND the stand contains more than 50% pines AND the stand is harvested during 4/1-11/30 (except for unusual weather patterns), the guide recommends the treatment at the time of harvesting.

►If I follow this guide, will all risk of introduction be eliminated?

The guide was developed to reduce the risk of introduction of the disease to a reasonable level, based on current scientific information available. It is not intended to eliminate all risks. As more research results become available, the guide will be adjusted.

►Is the fungicide treatment effective?

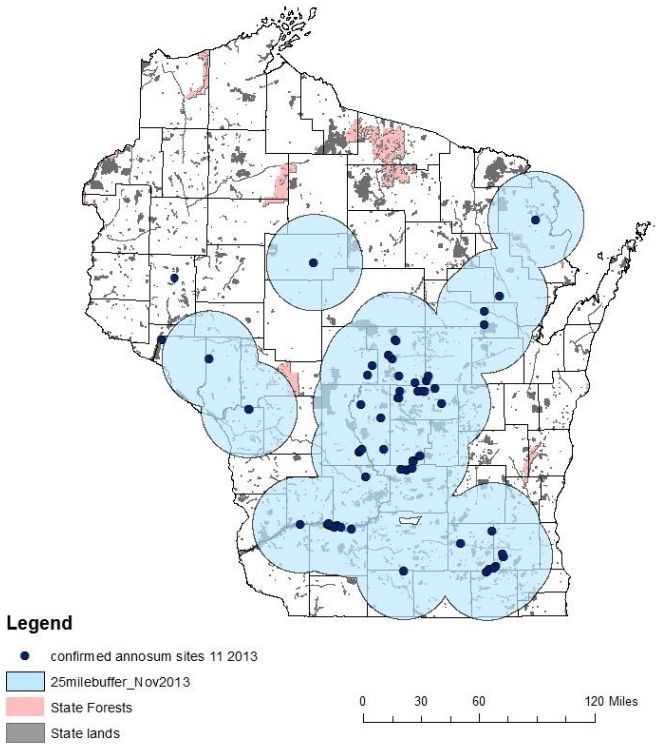
A review of over 80 published experimental results from North America and Europe concluded that the fungicide treatments are effective at controlling the pathogen. If done correctly, the fungicide treatment is proven to be effective in reducing the infection by 90%.

►Is the treatment recommended year-round?

No. Treatment is recommended from April 1 to November 30 except for unusual weather patterns.

The guide: Dichotomy annosum root rot treatment guide

1. Is the stand within 25 miles from a known stand of annosum root rot?
   - Yes – Go to 2
   - No – Go to D
2. Is the stand more than 50% pines (red, white, jack)?
   - Yes - Go to 3
   - No - Go to B
3. Is the stand going to have an intermediate thinning or final rotational harvest?
   - Intermediate Thinning - Go to 6
   - Final Rotational Harvest - Go to 4
4. Is the future desired stand more than 50% pine?
   - Yes - Go to 5
   - No (conversion) - Go to B
5. Is the site going to be mechanically site prepped within one year?
   - Yes - Go to C
   - No - Go to 6
6. Is the stand going to be harvested during 4/1-11/30?
   - Yes – Go to A
   - No – Go to E



Map of the distribution of annosum root rot and a 25-mile buffer

Areas in red are state forests. Gray areas are other state-managed lands. Yellow dots indicate the locations of individual stands where annosum root rot has been found. Blue circles indicate 25-mile buffers that were made based on the locations of known infected stands. Note: Two stands (one in Dunn and one in Buffalo County) are not buffered at this time as the pathogen has not been confirmed microscopically.

Guide/Recommendations

A. Treatment is recommended from April 1st to November 30th except under unusual weather patterns.

Examples of unusual weather conditions include but are not limited to:

- Prolonged, unusually warm weather during the winter period (Dec 1- Mar 31)
- Heavy snow cover outside of the winter period.

B. Treatment is not recommended. The risk is not considered high on tree species other than pines based on the current scientific information about the disease and observations in Wisconsin.

C. Treatment is not recommended because it would be ineffective. The site prep work that is done within one year after harvesting will create new wounds that will be susceptible for the disease even though the treatment at the time of cutting will protect the stumps temporarily. Note: Based on current scientific information, it is reasonable to believe that stumps will not be susceptible for infection when stumps are wounded one year or more after the stumps are created. Therefore if mechanical site prep is planned for one year or more after harvest, the treatment is recommended.

D. Treatment is not recommended because the stand is greater than 25 miles from a current known site. Note: The distance is based on confirmed sites and it is possible that there could be a site with the disease within 25 miles.

E. Treatment is not recommended. In general, viable spore counts are low[1] and applications through a spray attachment are operationally difficult due to freezing of chemical solution during the winter period (Dec 1 – Mar 31). However, treatment should be considered if unusually warm weather patterns persist during the winter period (Dec 1 – Mar 31) and such operational changes are practical in the field.

Additional clarification and definition:

- The effective date of the guide for state lands is **May 1, 2013**. A property manager should consider the guide on timber sales that will be announced on or after the effective date.
- There will be a **one year** grace period for implementation of the guide on state lands when a new buffer is created based on a newly confirmed stand.
- State land managers may be allowed to deviate from the guide under certain situations with written justification.
- Stands that will be included in the guide are the stands that have native pine species (red, white, jack) as a primary type (more than 50% of the basal area is pine).
- When a final cut is made, if a future desired stand is primarily pines, treatment is needed.
- The minimum tree size for treatment is "merchantable size (small end 4")" or "pole-size" trees.
- Trees that have been dead for more than one year do not need to be treated.
- The distance of 25-mile radius from a confirmed site was determined based on the limited scientific information currently available. This radius approach has been adapted by the guidelines that were developed by the USDA Forest Service. The 2010 Guidelines on National Forests in the Lake States state that sites that are within 25 miles of a known infection center should be considered high risk for infection, sites 25-50 miles from a known infection center be considered moderate risk for infection, and sites greater than 50 miles from a known infection center be considered low risk for infection. A distance analysis was made by calculating the minimum distance between a confirmed stand and another confirmed stand that was closest in Wisconsin. Based on the distance analysis, 37% of the confirmed stands had another confirmed stand(s) within 1 mile, 80% of the stand(s) within 10 miles, 90% of the stand(s) within 25 miles, and 98% of the stand(s) within 50 miles. Acreage that will not be treated (saved cost) and risk of disease introduction (financial loss) were compared for 1,10, 25, and 50 mile buffers to help make a decision to adapt a 25-mile radius.
- The proposed guide was developed based on the best available information and knowledge. The prescriptions will be adjusted as more research becomes available. The annosum root rot committee plans to review the guide based on newly available research data in March 2015, and recommend possible revisions to the guide to the WI DNR by May 2015.
- Information about the guide is available on-line at http://dnr.wi.gov/ (Key word: annosum, under "guide" tab).

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[1] The research was conducted by Dr. Glen Stanosz, Professor of University of Wisconsin-Madison. The research was funded by USDA Forest Service.

Appendix A: Background information about Annosum root rot

Annosum root rot is caused by the fungus *Heterobasidion irregulare*. The pathogen attacks the cambium of the host trees and kills them as well as causing wood decay. First confirmed in Wisconsin in 1993, the disease has been found in 23 Wisconsin counties, including Adams, Buffalo, Columbia, Dunn, Green, Iowa, Jefferson, Juneau, La Crosse, Marinette, Marquette, Oconto, Portage, Richland, Sauk, Shawano, Taylor, Trempealeau, Walworth, Waukesha, Waupaca, Waushara, and Wood Counties.

Although both conifer and deciduous trees are infected, coniferous trees appear to be much more susceptible to the disease. Currently annosum root rot is most commonly found on red and white pines in a plantation setting. Infection has been observed on jack, red, and white pines on overstory trees and red pine, white pine, jack pine, balsam fir, white spruce, eastern red cedar, oaks (both red and white), black cherry, buckthorn on understory. Of these species, mortality by the disease has been observed or suspected on red pine, white pine, jack pine, balsam fir, and eastern red cedar.

The fungus produces a fruit body near the soil line of an infected tree. Spores colonize mainly on the fresh stump, but also stem and root wounds. Stump infection is the most commonly observed pathway of introduction of Annosum root rot in Wisconsin. Once a stump is infected, the pathogen moves to nearby residual trees through root contact. Mortality of infected residual trees typically starts to appear 3-8 years after a thinning operation was performed. Since the fungus could persist in infected wood for many years, once the disease exists on a stand, control is very difficult. Therefore, prevention of this disease is very important.

A fungicide application has been proven to be effective to prevent establishment and growth of the pathogen on fresh cut stumps that are not infected yet. Two products are currently available in Wisconsin to prevent Annosum root rot. Sporax (sodium tetraborate decahydrate) is granular and can be applied using a salt-shaker style container or a special dispensing unit made of a PVC pipe and a plastic nozzle. Cellu-Treat (disodium octaborate tetrahydrate) is a water-soluble powder and can be applied using a backpack sprayer or an attachment to a processor.

Currently more than a dozen loggers in Wisconsin own a processor with a spray attachment. Due to the increased awareness for the disease and improved availability of loggers who offer the treatment, more stands have been treated with fungicides in Wisconsin. It is imperative to have the risk-based, scientifically-sound, and operationally-practical guide that can be used to help landowners, foresters, and loggers.

More information is available through the WI DNR website at http://dnr.wi.gov/. Key word: annosum.